Digole Serial:UART/I2C/SPI Character/Graphic LCD/OLED Display Module User Manual

This manual will describe most common futures for our Serial LCD/OLED displays and modules, each particular products may have different looks, size and material, but all interface to your master circuits and control commands are same, that means you can switch Digole Serial display in your application without any modification of you master circuit and software.
Our Serial display products are list in figure-1, you can purchase them with lowest price at:
http://www.digole.com/index.php?categoryID=153

What benefits you if using these products in you electronic projects?

- Save lots of the I/O resources: these products only need 1 to 3 I/O pins from your master controller that depends on the communication type you want.
- Easy to use: the commands sending to products are easy to remember and understand.

On Graphic serial products:

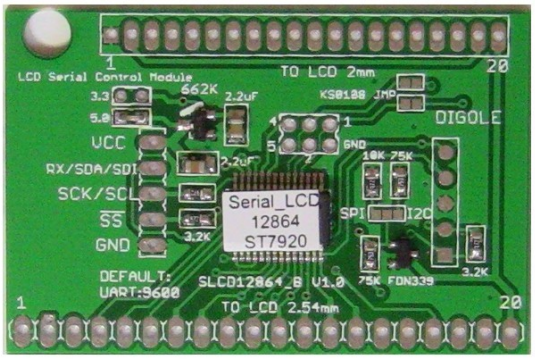
- Save huge memory space to store font and start screen on graphic display: in graphic product, there are 7 preloaded fonts ready for your application, and also have 16KB memory space for your user fonts, once you uploaded the start screen or user fonts, it will stored in products.
- Using user fonts function, you can display any graphs or characters in any language
- These products already integrated graphic functions such as: draw line/rectangle/circle/image, send few bytes of instruction to products, it will do it for you, that also save your lots of code space
- You can display contents in 4 different directions: 0º, 90º, 180º, 270º(clockwise) on same screen, the product will map the coordinate accordingly.

FEATURES:

- Communication mode: UART/I2C/SPI, detect your setting automatically
- Receiving buffer: 64/256 bytes
- Work with all microcontroller and microprocessor
- Communication signal can work on 3.3V and 5.0V TTL
- Default setting: UART baud 9600bps, I2C 0x27 address
- Low power consumption: less than 4mA (for adapter only, completed module may higher depends on the backlight power consumption)
- Simple command sets, easy to remember
- Simple graphic engine integrated (Graphic Products)
- 7 preloaded fonts, font's data structure full compatible with U8Glib(Graphic Products)
- UART baud (bps): 300, 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 115200

Character Serial LCD Adapter V1

Character Serial LCD Adapter V2



Universal Graphic Serial LCD Adapter

240x64 Dots Serial LCD

128x64 Serial COG LCD

128x64 Serial OLED(Blue/White, 1"/1.3")

Figure-1

What are adapters used for?

Character adapters can work with most 1602,1604,2002,2004 and 4002 character LCDs.
The Universal Graphic adapter work with 128 x 64 dots LCD, which LCD controller is ST7920 or KS0108 or ST7565.
We didn't sell adapters with a LCD due to you might already have LCDs or can easy to get one at low price from somewhere, so this way gives you more flexible options on your project.

How to set up the communication mode?

There are 3 different communication modes on all products: UART, I2C and SPI, what you need is just use solder to short the I2C/SPI jumper on adapter and make it works at I2C or SPI, if both jumpers are open, it works at UART, you can find a similar jumper like this:

on board.

Protocols:

- UART : 8-N-1, 8bits, No parity bit, 1 stop bit.
- I2C: Slave Mode, 7-bit address, default address is Hex:27, change able. This mode may give you a headache due to more signal options in I2C, but we make it works as standard, you just need setup your I2C on master controller as Standard Master Mode.
- SPI: 8-bits, MSB first, data on raise edge of SCK sampled; this is Standard setting on SPI too.

Character/Graphic Display Shared Command: (B-one byte, B...-Bytes)

Command	Description	Arduino lib function	note
CL	CLear screen and set the display position to first Column and first Row (x=0.y=0), for graphic LCD, it also set the font to default and turn off the cursor.	clearScreen();	The module will not execute this command until other command received.
CSB	set CurSor on/off	enableCursor(); disableCursor();	
BLB	Set Back Light ON/OFF, B=0 or 1, 0 off, 1 on	backLightOn(); backLightOff();	Nor available on Character Adapter V1
DCB	Display Config on/off, the factory default set is on, so, when the module is powered up, it will display current communication mode on LCD, after you design finished, you can turn it off	displayConfig(0); displayConfig(1);	
SBB...	Set UART Baud, B are ASCII characters, the available values are: "300", "1200", "2400","4800", "9600", "14400", "19200", "28800", "38400", "57600","115200"	Set BAUD when initial the class	When adapter power up or reset, always start with 9600 Baud
SI2CAB	Set I2C Address,the default address is 0x27, the adapter will store the new address in memory	setI2CAddress(0x34);	Change address to 0x34

STCRBBB BBB	Set Text Columns and Rows, this command will config your LCD if other than 1602 and the chip is other than KS0066U/F / HD44780	setLCDColRow(20,4);	The last 4 B should be"\x80\xC0\x94\xD4"
TPBB	set Text Position for following display	setPrintPos(6,1);	This will affect the following "TT" command

TTB...	display TexT string, the text will wraped in next row if the current row fulled, the Text Postion will be changed to the last char displyed, this command ended by 0x00 or 0x0D received	print(string);
		print(int);
		print(char);
		print(float);
		print(double);
		drawStr(x,y,string);
			The print function in Arduino, also can print other data and format the out put.

MCDB	Manual CommanD: send command B to display bypass the adapter	directCommand(0xaf);	Use it if you want to control the display directly
MDTB	Manual DaTa: send data B to display bypass the adapter	directData(0x88);	Same as above

Graph Display Command: (B-one byte, B...-Bytes)

Command	Description	Arduino lib function	note
DMB	Set the Display Mode for on coming command, the available values for B are: "!""~" not, "|" or, "^" xor, "&" and, this means the next drawing pixel will logic operation with pixel already on screen.	setMode('!');	Like the Bitwise Operator in C
DIMBBBB B...	Display Image, 1st B is x postion, 2nd is y, 3rd B is image width, 4th is height, then following data. Each byte present 8 pixels, if the image width not divide 8, the last byte of a row only contain few pixels, eg. For width of 9 to 16, you need 2 bytes for a row	drawBitmap(x,y,width,high,*data);	

SDB	Send graphic fuction Direction, the value of B is 0 to 3, represent0 to 270 degree respectively.	setRotation(0);
		undoRotation();
		setRot90();
		setRot180();
		setRot270();
			The setRotation(); will accept 0 to 3 represent0 to 270 degree respectively

CTB	Set display ConTrast, only for some models	setContrast(30);	
FRBBBB	Draw a Filled Rectangle, 4 B are: X,Y(left top), X,Y (right bottom)	drawBox(x,y,width,height);	In order to compatible with u8g, drawBox() in Arduino use width and height
DRBBBB	Draw a Rectangle, 4 B are: X,Y(left top), X,Y (right bottom)	drawFrame(x,y,width,height);	drawFrame () in Arduino use width and height
CCBBBB	Draw a CirCle, 4 B are: X,Y, radius, filled or not	drawCircle(x,y,r,f); drawDisc(x,y,r);	f=1 means filled circel
DPBBB	Draw a Pixel, 3 B are: x,y and color	drawPixel(x,y,color);	

LNBBBB	Draw a Line from (x,y) to (x1,y1), 4 B are: x,y,x1,y1	drawLine(x,y,x1,y1);
		drawHLine(x,y,width);
		drawVLine(x,y,height);
			drawHLine()-horizontal line
			drawVLine()-veritcal line

LTBB	Draw a Line from Tast position to (x,y), 2 B are:x,y	drawLineTo(x,y);	
TRT	Move text cursor to next line(call Text ReTurn)	nextTextLine();	The y pixels moved depending on the font size current using
SFB	Set Font, follow by the font number, preloaded font number is: 6,10,18,51,120,123,0(default), user font number is 200,201,202,203 maps to 4 user font memory sections, you can combine adjacent sections together is the font size >4kb(each section has 4kb in size)	setFont(0);	We already map preloaded font to 0 to 5 in arduino lib
SCB	Set Color for following drawing	setColor(1);	0 and 1 for black white screen
MABBBBBB	Move rectangle Area on screen to another place, the 6 B are represent: (x,y)(left- top),(w,h)(width-height), (xoffset,yoffset).	moveArea(x,y,w,h,xoffset,yoffset);	
ETB	Enhanced set the current Text position Back to last char, this function will allow you display multiple chars at same position.	setTextPosBack();	
ETOBB	Enhanced set Text position Offset, the 2 B are xoffset then yoffset, it will adjust the text position in pixels	setTextPosOffset(xoffset, yoffset);	
ETPBB	Enhanced set Text Position as pixels on screen, the 2 B are x, y coordinate on screen	setTextPosAbs(x,y);	
SSSBBB…	Set Start Screen, 1st B is the lower byte of data length, 2nd B is the higher byte of data length, following by data	uploadStartScreen(1024, *data);	The length of data should be: screen Width*High/8, eg. For 128x64 LCD, the length is 1024
SUFBBBB…	Set User Font, 1st B is section of memory you want to upload, 2nd B is the lower byte of data length, 3rd B is the higher byte of data length, following by data	uploadUserFont(1,1434, *data);	
DSSB	Display Start Screen stored in memory, also set up Automatic start screen display or not on next power up	displayStartScreen(1 or 0)	
DOUTB	Send a Byte to output head on board, the current driving ability for each pin is: 25mA (Sink/Source)	digitalOutput(0x1F);	The output head are vary from adapters
SLPB	Set Line Pattern when drawing line, only for new version firmware later than Jan. 2013. eg. B=0xAA is dot line, B=0xFA is dash line	setLinePattern(pattern);	Old version not support this fucntion

Special Command: (B-one byte, B…-Bytes)

Command	Description	Arduino lib function	note
SLCDB	Only for multi-chip driver adapter: B=0 or '0' for ST7920 B=1 or '1' for KS0108 B=2 or '2' for ST7565	setLCDChip(chip);	For Universal Graphic Serial LCD Adapter only

Pinout of this module connect to MCU:

PIN	Description	PIN	Description
1	GND (0V)	2	SS: **SPI mode only** chip select control in, low active
3	**I2C and SPI mode:** SCK/SCL: Clock in	4	**UART mode:** RX **I2C mode:** SDA **SPI mode:** SDI
5	VCC: power supply 1.8V to 5.5V depends on you LCD		

Connect with your master circuit: